

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-28 (Canceled)

Claim 29 (New) A conductive organic-inorganic hybrid material comprising a mineral phase in which walls define pores forming a structured mesoporous network with open porosity; said material further comprising an organic oligomer or polymer integrated in said walls and bonded covalently to the mineral phase, and optionally another phase inside the pores, composed of at least one surface active agent ; at least one of the mineral phase, and the organic oligomer or polymer having conductive and/or hydrophilic functions.

Claim 30 (New) The material of claim 29, wherein the mineral phase has conductive and/or hydrophilic functions on the surface of its pores.

Claim 31 (New) The material of claim 29, wherein the organic oligomer or polymer has conductive and/or hydrophilic functions.

Claim 32 (New) The material of claim 29, wherein the optional phase composed of at least one surface active agent has conductive and/or hydrophilic functions.

Claim 33 (New) The material of claim 29, wherein said conductive functions are selected from cation exchange groups.

Claim 34 (New) The material of claim 33, wherein said cation exchange groups are selected from the following groups: SO₃M; -PO₃M₂; -COOM and B(OM)₂, where M represents hydrogen, a monovalent metal cation, or ⁺NR¹₄, where each R¹, independently, represents a hydrogen, an alkyl radical or an aryl radical.

Claim 35 (New) The material of claim 29, wherein said conductive functions are selected from anion exchange groups.

Claim 36 (New) The material of claim 35, wherein said anion exchange groups are selected from the following groups: pyridyl, imidazolyl, pyrazolyl; triazolyl; the radicals of formula $^+NR_3^2X^-$, where X represents F, Cl, Br, I, NO₃, SO₄H or OR, R being an alkyl radical or an aryl radical, and where each R², independently, represents a hydrogen, an alkyl radical or an aryl radical; and the basic aromatic or nonaromatic radicals containing at least one radical selected from imidazole, vinylimidazole, pyrazole, oxazole, carbazole, indole, isoindole, dihydrooxazole, isoxazole, thiazole, benzothiazole, isothiazole, benzimidazole, indazole, 4,5-dihydropyrazole, 1,2,3-oxadiazole, furazan, 1,2,3-thiadiazole, 1,2,4-thiadiazole, 1,2,3-benzotriazole, 1,2,4-triazole, tetrazole, pyrrole, aniline, pyrrolidine, and pyrazole radicals.

Claim 37 (New) The material of claim 29, wherein the mineral phase is composed of at least one oxide selected from metal oxides, metalloid oxides and mixed oxides thereof.

Claim 38 (New) The material of claim 37, wherein said oxide is selected from the oxides of silicon, titanium, zirconium, hafnium, aluminum, tantalum, tin, rare earths and mixed oxides thereof.

Claim 39 (New) The material of claim 29, wherein the mesoporous network has an organized structure with a repeating unit.

Claim 40 (New) The material of claim 39, wherein the mesoporous network has a cubic, hexagonal, lamellar, vermicular, vesicular or bicontinuous structure.

Claim 41 (New) The material of claim 29, wherein the size of the pores is from 1 to 100 nm.

Claim 42 (New) The material of claim 29, wherein the organic polymer is a thermally stable polymer.

Claim 43 (New) The material of claim 42, wherein the organic polymer is selected from polyetherketones; polysulfones; polyethersulfones; polyphenylethersulfones; styrene/ethylene, styrene/butadiene, and styrene/isoprene copolymers; polyphenylenes;

polyimidazoles; polyimides; polyamideimides; polyanilines; polypyroles; polysulfonamides; polypyrazoles; polyoxazoles; polyethers; poly((meth)acrylic acid)s; polyacrylamides; polyvinyls; acetal resins; polyvinylpyridines; polyvinylpyrrolidones; polyolefins; poly(styrene oxide)s; fluoro resins and polyperfluorocarbons; poly(vinylidene fluoride)s; polychlorotrifluoroethylenes; polyhexafluoropropenes; perfluoroalkoxides; polyphosphazenes; silicone elastomers; and block copolymers comprising at least one block composed of a polymer selected from the above polymers.

Claim 44 (New) The material of claim 29, wherein the surface active agent is selected from alkyltrimethylammonium salts, alkyl phosphate salts, alkylsulfonate salts, dibenzoyltartaric acid, maleic acid, long chain fatty acids, urea, long chain amines, phospholipids, doubly hydrophilic copolymers whose amphiphilicity is generated in situ by interaction with a substrate, and amphiphilic multiblock copolymers comprising at least one hydrophobic block in combination with at least one hydrophilic block.

Claim 45 (New) A membrane comprising the material of claim 29, optionally deposited on a support.

Claim 46 (New) An electrode comprising the material of claim 29.

Claim 47 (New) A fuel cell comprising at least one membrane comprising a conductive organic-inorganic hybrid material comprising a mineral phase in which walls define pores forming a structured mesoporous network with open porosity; said material further comprising an organic oligomer or polymer integrated in said walls and bonded covalently to the mineral phase, and optionally another phase inside the pores, composed of at least one surface active agent ; at least one of the mineral phase, and the organic oligomer or polymer having conductive and/or hydrophilic functions, said membrane optionally deposited on a support;

and/or at least one electrode comprising a conductive organic-inorganic hybrid material comprising a mineral phase in which walls define pores forming a structured mesoporous network with open porosity; said material further comprising an organic oligomer or polymer integrated in said walls and bonded covalently to the mineral phase, and optionally another phase inside the pores, composed of at least one surface active agent; at

least one of the mineral phase, and the organic oligomer or polymer having conductive and/or hydrophilic functions.

Claim 48 (New) A process for preparing the material of claim 29, comprising the following steps:

- a) - synthesizing a precursor compound A, composed of an organic oligomer or polymer which carries precursor functions of the mesoporous mineral phase, and preparing an organic-inorganic hybrid solution in a solvent of said precursor compound A;
- b) - hydrolyzing the organic-inorganic hybrid solution obtained in step a) and allowing the solution to age;
- c) - diluting the hydrolyzed and aged organic-inorganic hybrid solution of the precursor compound A, obtained in step b), in a solvent of a mineral precursor B intended to constitute the mesoporous mineral phase, whereby a new organic-inorganic hybrid solution is obtained ;
- d) - hydrolyzing the organic-inorganic hybrid solution obtained in step c) and allowing the solution to age;
- e) - preparing a solution, in a solvent, of a surface active agent D, a templating, texturizing, agent for the mesoporous mineral phase;
- f) - mixing the solution obtained in step c) with the solution obtained in step e) to give a solution S;
- g) - optionally, hydrolyzing the solution S obtained in step f) and allowing the solution S to age;
- h) – depositing or impregnating the hydrolyzed and aged hybrid solution S on a support;
- i) – evaporating solvents under controlled pressure, temperature, and humidity conditions;
- j) – carrying out a heat treatment to consolidate the material;
- k) – optionally removing the surface active agent D completely or partially;
- l) – optionally separating or removing the support.

Claim 49 (New) The process of claim 48, wherein additionally a chelating agent E is added to the solution S obtained in step f).

Claim 50 (New) The process of claim 48, wherein, during step c), to the

solution based on the organomineral precursor A, a compound C is further added which carries, on the one hand, conductive and/or hydrophilic functions and/or precursor functions of conductive and/or hydrophilic functions, and, on the other hand, functions capable of undergoing bonding to the surface of the pores of the mesoporous network.

Claim 51 (New) The process of claim 48, wherein the process further comprises a final step of treatment to liberate or generate conductive and/or hydrophilic functions on the surface of the pores of the material.

Claim 52 (New) The process of claim 48, wherein the organic-inorganic hybrid solution obtained in step a) is left to age at a temperature of 0 to 300°C; at a pressure of 100 Pa to $5 \cdot 10^6$ Pa; for a time of a few minutes to a few days.

Claim 53 (New) The process of claim 48, wherein the organic-inorganic hybrid solution obtained in step c) is left to age at a temperature of 0°C to 300°C; at a pressure of 100 Pa to $5 \cdot 10^6$ Pa; for a time of a few minutes to several days.

Claim 54 (New) The process of claim 48, wherein the solution S obtained in step f) is left to age at a temperature of 0 °C to 300°C; at a pressure of 100 Pa to $5 \cdot 10^6$ Pa; for a time of a few minutes to a few days.

Claim 55 (New) The process of claim 48, wherein the solvents are evaporated at a temperature of 0 to 300°C; at a relative humidity (RH) of 0 to 100%.

Claim 56 (New) The process of claim 48, wherein, in step h), the organic-inorganic hybrid solution is deposited or impregnated on a support by a method selected from the method of deposition by centrifugal coating known as spin coating, the method of deposition by immersion and withdrawal known as dip coating, the method of deposition by laminar coating known as meniscus coating, the method of deposition by spraying known as “spray coating”, the method of deposition by casting and the method of deposition by evaporation.

Claim 57 (New) The material of claim 37, wherein said oxide is selected from the oxides of europium, cerium, lanthanum, and gadolinium, and mixed oxides thereof.

Claim 58 (New) The material of claim 29, wherein the size of the pores is from 1 to 50 nm.

Claim 59 (New) The process of claim 48, wherein the organic-inorganic hybrid solution obtained in step a) is left to age at a temperature of 20°C to 200°C; at a pressure of 1000 Pa to $2 \cdot 10^5$ Pa; for a time of one hour to one week.

Claim 60 (New) The process of claim 48, wherein the organic-inorganic hybrid solution obtained in step c) is left to age at a temperature of 20°C to 200°C; at a pressure of 1000 Pa to $2 \cdot 10^5$ Pa; for a time of one hour to one week.

Claim 61 (New) The process of claim 48, wherein the solution S obtained in step f) is left to age at a temperature of 20°C to 200°C; at a pressure of 1000 Pa to $2 \cdot 10^5$ Pa; for a time of one hour to one week.

Claim 62 (New) The process of claim 48, wherein the solvents are evaporated at a temperature of 10°C to 160°C; at a relative humidity (RH) of 20% to 95%.